## REMARKS

Claims 1-29 are pending. Claims 1-8, 10, and 12-19 are withdrawn from consideration. Claims 9, 11, 22, and 23 were rejected under 35 U.S.C. § 112, first paragraph; claims 9, 11, 22, 23, 26, and 29 were rejected under 35 U.S.C. § 112, second paragraph; and claims 9, 11, and 20-29 were rejected under 35 U.S.C. § 102. Applicants address each of these rejections as follows.

### Summary of the Invention

The present invention features methods of using a novel serotonin-gated anion channel for identifying a compound that modulates a biological activity of a serotonin-gated anion channel (claims 9 and 20-22, and their dependent claims). The invention also features methods for characterizing a drug as being associated with a serotonin-mediated response (claims 11 and 23, and their dependent claims).

### Claim Amendments

Claim 9 and 22 have been amended to recite the step of contacting a cell with a purified nucleic acid sequence that encodes a serotonin-gated anion channel that is expressed by the cell and that selectively permits passage of anions into or out of the cell in response to binding serotonin. Support for this amendment may be found, for example, at page 25, lines 2-18, and page 27, lines 9-17, of the specification. Similarly, claims 11

and 23 have been amended to clarify that the serotonin-gated anion channel is purified and that the serotonin-gated anion channel selectively permits passage of anions from one side of a membrane to the other in response to binding serotonin. Support for these amendments may be found, for example, at page 15, lines 2-14, and at page 25, lines 2-18, of Applicants' specification. Claims 20 and 21 have been amended to refer to a method that utilizes a transgenic nematode that over-expresses a serotonin-gated anion channel, and to refer to specific hybridization conditions. Support for these amendments may be found, for example, at page 13, lines 14-19, page 19, lines 16-20, and page 33, line 12, to page 34, line 11. In addition, new claims 30-33 find support, for example, at page 17, lines 14-18, page 19, lines 16-20, page 25, lines 2-11, and page 39, lines 10-18, of Applicants' specification.

Claim Objections

Claims 22 and 23 were objected to for being in improper dependent form. Claims 22 and 23, as amended, are independent claims. This objection may be withdrawn.

Rejection under 35 U.S.C. § 112, first paragraph

Claims 9, 11, 22, and 23 stand rejected under 35 U.S.C. § 112, first paragraph, for a lack of written description. In particular, the Office asserts (page 5):

> The instantly claimed method requires that a functional serotonin-gated anion channel be presented in order to assay affects on said receptor, however the specification fails to

> provide any clear and specific guidance to what these receptors would be, and more specifically, what sequences would be used besides the functional sequence set forth in SEQ ID NO: 2. The specification fails to adequately describe any other serotonin-gated sequences besides that set forth in SEQ ID NO: 2 which would meet the functional limitations necessary for use in the practice of the method as claimed. The claimed invention as a whole is not adequately described if the claims require essential or critical elements which are not adequately described in the specification and which are not conventional in the art as of Applicants effective filing date.

Applicants submit that the present claims, as amended, are free of this rejection for the following reasons.

Applicants first draw the Office's attention to the case law and point out that their patent specification does not need to describe exactly all the subject matter that is claimed. *In re Daniels*, 114 F.3d 1452, 46 U.S.P.Q.2d 1788 (Fed. Cir. 1998); *Ralston Purina Co. v. Far-Mar-Co., Inc.*, 772 F.2d 1570, 227 U.S.P.Q. 117 (Fed. Cir. 1985). Rather, Applicants need only communicate to those skilled in the art that the claimed subject matter is intended to be part of their invention. As stated by the Federal Circuit in *Martin v. Mayer*, 823 F.2d 500, 3 U.S.P.Q.2d 1333 (Fed. Cir. 1987):

> [T]he specification must 'convey clearly to those skilled in the art to whom it is addressed...the information that [the inventor] has invented the specific subject matter later claimed.'

Moreover, the M.P.E.P. § 2163.02 (Eighth Edition, August 2001) states:

> [A]n objective standard for determining compliance with the written description requirement is, "does the description clearly allow persons of ordinary skill in the art to recognize

that he or she invented what is claimed."

In applying this standard, the Federal Circuit has held that the specification must convey with reasonable clarity to a skilled artisan that the inventor "was in possession of the invention" at the time of filing. *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 19 U.S.P.Q.2d 1111 (Fed. Cir. 1991). Moreover, in *Lilly*, the Federal Circuit acknowledged that "every species in a genus need not be described in order that a genus meets the written description requirement." *Regents of the University of California v. Eli Lilly and Co.*, 119 F.3d 1559, 43 U.S.P.Q.2d 1398, 1405 (Fed. Cir. 1997) (citing *Utter v. Hiraga*, 845 F.2d 993, 6 U.S.P.Q.2d 1709 (Fed. Cir. 1988)) ("A specification may, within the meaning of § 112, ¶ 1, contain a written description of a broadly claimed invention without describing all species that claim encompasses.") The *Lilly* court further acknowledged that "it may not be necessary to enumerate a plurality of species if a genus is sufficiently identified ... by other appropriate language." *Lilly*, 119 F.3d at 1569.

Applicants have plainly met these standards because their specification would certainly indicate to one of ordinary skill in the art that Applicants discovered a family of functional serotonin-gated anion channels. Applicants' specification clearly describes to the skilled worker what is claimed. For example, with respect to claims 9, 11, 22, and 23 the specification, for example, at page 25 (lines 2-11), teaches that MOD-1 forms a serotonin-gated anion channel. In particular, Applicants submit that, even though the claimed invention is exemplified by a single serotonin-gated anion channel, one of skill in

the art reading this specification would have readily recognized that this gene was provided for the purpose of illustrating the invention and that Applicants' invention included any functional serotonin-gated anion channel that is structurally related based on the ability of nucleic acid sequence encoding this channel to hybridize under stringent conditions to the nucleic acid sequence of SEQ ID NO:2. For instance, at page 16, lines 9-11, the specification states that, "preferably the nucleic acid sequence encoding a serotonin-gated anion channel hybridizes to a *mod-1* nucleic acid sequence" (emphasis added). Such hybridization techniques are described quite specifically, for example, at page 33, line 12, to page 34, line 11. In view of these teachings, the specification clearly conveys Applicants' presently claimed invention to those persons of skill in the art. The description in the specification also allows the skilled worker to identify and recognize other species falling within the present claims. Based on this description, one skilled in the art would recognize that Applicants' invention encompassed, not one gene, but a family of genes encoding serotonin-gated anion channel polypeptides, and, on this basis alone, the written description rejection may be withdrawn.

Moreover, Applicants submit that their specification provides a written description of the presently claimed invention in sufficient detail to satisfy the standard set by the Federal Circuit in *Lilly*, 43 U.S.P.Q.2d 1398. In particular, this case specifically states that the written description of a genus of DNA may be achieved by a "recitation of structural features common to members of the genus." *Lilly*, 43 U.S.P.Q.2d 1398, 1406.

Applicants point out that the description of the claimed invention in Applicants' specification does not rely simply on the disclosed nucleic acid sequence encoding the MOD-1 serotonin-gated anion channel. Rather, the present specification describes a class of nucleic acid sequences that specifically hybridize to the sequence of SEQ ID NO:2 under specific conditions and that encode polypeptides that function as serotonin-gated anion channels. The specification thereby describes the serotonin-gated anion channels by specific structural features that are common to the class. Applicants' specification therefore provides a description of the class of nucleic acid molecules encompassed by the present claims in a form entirely consistent with the standard set out in *Lilly*, and, on this basis, the 35 U.S.C § 112, first paragraph, rejection should be withdrawn.

Applicants' specification also satisfies the written description requirement as set forth in the U.S. Patent & Trademark Office's Written Description Guidelines (http://www.uspto.gov/web/menu/offices/pac/writtendesc.pdf; "the Guidelines"). In particular, the Guidelines provide an example (Example 9:Hybridization), where a single cDNA species which encodes a protein that binds to a dopamine receptor and stimulates adenylate cyclase is disclosed in the specification. The claim, in Example 9 of the Guidelines, is directed to a genus of nucleic acids all of which must hybridize under high stringency conditions with the disclosed cDNA and must encode a protein with a specific activity. In concluding that the written description requirement was satisfied in this Example, the Guidelines state:

> [A] person of skill in the art would not expect substantial

> variation among species encompassed within the scope of the claims because the highly stringent hybridization conditions set forth in the claim yield structurally similar DNAs. Thus, a representative number of species is disclosed, since highly stringent hybridization conditions in combination with the coding function of DNA and the level of skill and knowledge in the art are adequate to determine that applicant was in possession of the claimed invention. (Emphasis added.)

The facts of the present case are squarely within these Guidelines. Applicants' claims encompass a nucleic acid molecule that specifically hybridizes under stringent conditions to the complement of the sequence set forth in SEQ ID NO:2, wherein the nucleic acid molecule encodes a serotonin-gated anion channel that selectively permits passage of anions from one side of a membrane to the other in response to binding serotonin. As in Example 9, Applicants' specification describes (i) at least a single species of a nucleic acid molecule falling within the scope of the claimed genus and (ii) an activity of the protein, serotonin-gated anion channel function, encoded by the nucleic acid molecule. A person of ordinary skill in the art would not expect substantial variation among species encompassed with the scope of the invention as claimed. The stringent hybridization requirement necessarily yields structurally similar nucleic acids which, when combined with the functionality requirement, describes a genus of nucleic acid molecules. Therefore, in this case, as in Example 9, the single disclosed species is representative of the genus.

Moreover, as amended, claims 9, 11, 22, and 23 are directed to a serotonin-gated anion channel that, in response to serotonin, opens and selectively permits passage of

anions from one side of the channel to the other. Accordingly, the receptor recited in the claim has to be functional. The specification, for example, at page 24, line 6, to page 25, line 18, describes MOD-1 as being a functional serotonin-gated anion channel and provides a number of assays that may be used to determine if a receptor is functional. Such assays are standard in the art and clearly convey to the skilled artisan that Applicants describe a family of serotonin-gated anion channels.

In sum, there can be no question that Applicants were in possession of the claimed genus at the time their application was filed, and that one skilled in the art would recognize Applicants' disclosure as a description of the invention defined by claims 9, 11, 22, 23, and their dependent claims. As a result, Applicants' specification clearly satisfies the written description requirement, as set forth by the case law and the M.P.E.P., and Applicants request reconsideration and withdrawal of the 35 U.S.C. § 112, first paragraph, rejection.

Rejection under 35 U.S.C. § 112, second paragraph

Claims 9, 11, 22, 23, 26, and 29 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Claims 26 and 29 have been canceled and the rejection of these claims therefore is moot. With respect to the remaining claims, Applicants submit that, in view of the present claim amendments, this rejection may be withdrawn.

Rejection under 35 U.S.C. § 102

Claims 9, 11, and 22-29 stand rejected under 35 U.S.C. § 102(a) as being anticipated by Scrogin et al. (Am. J. Physiol. 275:R2035-R2042, 1998; "Scorgin") and Ali et al. (J. Physiol. 509:211-219, 1998; "Ali"). Claims 9, 11, and 22-29 further stand rejected under 35 U.S.C. § 102(b) as being anticipated by De Montigny et al. (Science 202:1303-1306, 1978; "De Montigny") and Garner et al. (Eur. J. Pharm. 239:31-37, 1993; "Garner"). Claims 20 and 21 also stand rejected under 35 U.S.C. § 102(a) as being anticipated by Hamdan et al. (J. Neurochemistry 72:1372-1383, 1999; "Hamdan"), and claims 9, 11, and 20-29 stand rejected under 35 U.S.C. § 102(a) as being anticipated by Horvitz et al. (Science 216:1012-1014, 1982; "Horvitz").

*Rejections over Scrogin, Ali, De Montigny, and Garner*

To anticipate a claim, the prior art has to teach each and every element set forth in that claim. The Office asserts (page 11):

> Scrogin *et al.*, Ali *et al.*, Montigny *et al.* and Garner *et al.* disclose a cell which expresses a serotonin-gated anion channel and methods of assaying the effectiveness of compounds on the activity of said channel. Examiner concedes that the references do not teach the specific hybridization conditions set forth in the claim, nor the specific sequences which encode the serotonin-gated anion channel assayed in the references. However, given that the specification teaches that the hybridization conditions specifically taught can be used to identify related sequences encoding serotonin-gated anion channels, there is no evidence of record which would indicate that the sequences comprised in the cells taught in each Scrogin *et al.*, Ali *et al.*, Montigny

*et al.* and Garner *et al.* would not hybridize under the conditions set forth in the claim.

The Office also asserts that claims 9 and 11 "can reasonably be interpreted to encompass the endogenous sequence comprised in the genome of the cell."

In this regard, Applicants note that none of the cited references describe a purified nucleic acid sequence that hybridizes under stringent conditions to the nucleic acid sequence of SEQ ID NO:2. Claims 9 and 22, as amended, require a step of contacting a cell with a purified nucleic acid sequence that hybridizes under stringent conditions to the sequence of SEQ ID NO:2. The specification, at page 15, lines 22-24, defines a purified nucleic acid as one "that is free of the genes which, in the naturally-occurring genome of the organism from which the nucleic acid ... is derived, flank the gene." None of the cited references describes a serotonin-gated anion channel encoded by a purified nucleic acid sequence as encompassed by claim 9 or claim 22, and their dependent claims. Moreover, an endogenous nucleic acid sequence encoding a serotonin-gated anion channel also is not a purified nucleic acid sequence. Similarly, claim 11 and 23, and their dependent claims, are directed to the use of a purified serotonin-gated anion channel and, therefore, cannot be anticipated by the cited prior art or by an endogenous serotonin-gated anion channel. The 35 U.S.C. § 102 rejection over Scrogin, Ali, De Montigny, and Garner may be withdrawn.

*Rejections over Hamdan and Horvitz*

The Office asserts that Hamdan teaches "the serotonin receptor is associated with multiple observable phenotypes including affects on neurosecretory motor neurons which affect locomotion." With respect to Horvitz, the Office states (page 12):

> Horvitz *et al.* provide a general review of the nervous system in *C. elegans* and describe the implication of observable affects elicited through the exogenous application of serotonin to a population of *C. elegans* ... Among the affects observed upon delivery of serotonin is the decreased locomotion.

Both the rejections over Hamdan and Horvitz appear to be directed to claims 20 and 21, which generally are directed to methods for identifying a compound that modulates the activity of a serotonin-gated anion channel in a behavioral assay utilizing nematodes. As amended, claims 20 and 21 require a step of exposing a transgenic nematode that over-expresses a purified nucleic acid sequence that hybridizes under stringent conditions to the nucleic acid sequence of SEQ ID NO:2, and that encodes a serotonin-gated anion channel, to a test compound. Neither Hamdan nor Horvitz describe such a purified nucleic acid sequence, much less a transgenic nematode over-expressing such a nucleic acid sequence. Hamdan describes serotonin receptors which mediate their effect through second messenger pathways and, therefore, are not serotonin-gated anion channels, and Horvitz describes the effects of serotonin and octopamine on nematode behavior. These references fail to describe the central feature of the presently claimed invention; namely, a purified nucleic acid sequence that hybridizes under stringent

conditions to the nucleic acid sequence of SEQ ID NO:2, and that encodes a serotonin-gated anion channel that selectively permits passage of anions from one side of a membrane to the other in response to binding serotonin. Accordingly, these references do not anticipate claims 20 and 21, or any other pending claim. The 35 U.S.C. § 102 rejection over Hamdan and Horvitz may be withdrawn.

## CONCLUSION

Applicants note that the Examiner's Action was mailed to the incorrect address. Effective immediately, please address all communication in this application to:

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Applicants submit that the claims are now in condition for allowance and such action is respectfully requested.

Enclosed is a petition to extend the period for replying for one month, to an including November 25, 2002. Also enclosed are "marked-up" versions of the amended claims and a clean version of all pending claims. In addition, enclosed is a check in the amount of $204.00 to cover the additional claims fee. If there are any other charges or any credits, please apply them to Deposit Account No. 03-2095.

Respectfully submitted,

Date: November 25, 2002

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